REMARKS

Claims 1-6 and 8-21 are currently pending in the subject application and are presently under consideration. Claims 1, 4, 9, 10, 12, 14, and 16-21 have been amended as shown on pp. 2-8 of the Reply. Claim 11 has been canceled without prejudice or disclaimer.

Applicants' representative thanks the Examiner for the courtesies extended during the telephonic interview on August 16, 2007, between Examiners Dorothy S. Siedler and Talivaldis I. Smits and Applicants' representative Bradley D. Spitz. During the interview, the rejection of claims 1-19 under 35 U.S.C. §101 was discussed. Based on proposed amendments to the relevant claims and remarks related thereto, an agreement to withdraw the rejection under 35 U.S.C. §101 was reached. Further, proposed claim amendments in view of the rejection of claims 1-5, 7-13, and 19-21 under 35 U.S.C. §103 were discussed.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1-19 Under 35 U.S.C. §101

Claims 1-19 stand rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Withdrawal of this rejection is requested for at least the following reasons. The subject matter of claims 1-19 is patentable because it can be used in a practical application to produce a useful, tangible, and concrete result. In *Eolas Techs., Inc. v. Microsoft Corp.*, 399 F.3d 1325 (Fed. Cir. 2005), the Federal Circuit held that software code can be patentable subject matter:

> Title 35, section 101, explains that an invention includes "any new and useful process, machine, manufacture or composition of matter." ... Without question, ***software code alone qualifies as an invention eligible for patenting under these categories***, at least as processes. *Id.* at 1338 (emphasis added).

According to *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352 (Fed. Cir. 1999), the legal standard set forth by the Federal Circuit for determining whether claims are directed to statutory subject matter is whether the claims can be applied in a practical application to produce a useful, concrete and tangible result. Applicants' representative

has amended claim 1 for clarity. As written, claim 1 clearly satisfies the legal standard given by *AT&T*. *See* MPEP 2106. In particular, claim 1 recites: ***A system that facilitates speech recognition*** *by modeling speech dynamics, comprising: an input component that receives acoustic data; and* ***a model component that employs the acoustic data to characterize speech, the model component comprising model parameters that form a mapping relationship from unobserved speech dynamics to observed speech acoustics, the model parameters are employed to decode an unobserved phone sequence of speech based, at least in part, upon a variational learning technique;*** *wherein the model component is based, at least in part, upon a hidden dynamic model in the form of a segmental switching state space model, the segmental switching state space model comprises respective states having respective durations in time corresponding to soft boundaries of respective phones in the unobserved phone sequence.* Thus, claim 1 elicits a system that can be applied in a practical application that culminates in a useful, concrete and tangible result. More particularly, independent claim 1 recites a system that facilitates the recognition of a series of spoken phones, which can be combined to form words, phrases, and other speech units, based on acoustic speech data. Further, the subject specification supports that the system recited in independent claim 1 produces a useful, concrete, and tangible result. For example, the specification discloses that commands and/or information can be provided to a computer *via* a microphone. (*See* p. 20, ll. 12-16; Fig. 10, refs. 1012 (computer) and 1036 (input device)). The system recited by independent claim 1 can then receive acoustic data from the microphone and recover phone sequences of speech therefrom. The phone sequences can then be synthesized to provide the provided commands and/or information to the computer in a form usable by the computer, from which the commands and/or information can be used in connection with a system application (*see* p. 20, ll. 7-9; Fig. 10, ref. 1030), transferred to a remote computer (*see* p. 20, l. 28 – p. 21, l. 2; Fig. 10, ref. 1044), and/or used in other appropriate manners. Accordingly, withdrawal of this rejection with respect to independent claim 1 is respectfully requested.

Independent claims 12, 14, 17, and 19 have been amended to recite similar features, namely systems and/or methods that respectively facilitate recognition of a

series of spoken phones based on acoustic speech data. Accordingly, withdrawal of this rejection with respect to independent claims 12, 14, 17, and 19 is respectfully requested.

II. Rejection of Claims 1-5, 7-13, and 19-21 Under 35 U.S.C. §103(a)

Claims 11-5, 7-13, and 19-21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hogden (US 6,052,662) in view of Ghahramani *et al.*, "Variational Learning for Switching State-Space Models" (Neural Computation 2000). Withdrawal of this rejection is requested for at least the following reasons. The cited references, either alone or in combination, do not disclose or suggest all features recited in the subject claims as amended.

> To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *See* MPEP §706.02(j). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *See In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Amended independent claim 1 (and its corresponding dependent claims) recites: *A system that facilitates speech recognition by modeling speech dynamics, comprising: an input component that receives acoustic data; and a model component that employs the acoustic data to characterize speech, the model component comprising model parameters that form a mapping relationship from unobserved speech dynamics to observed speech acoustics, the model parameters are employed to decode an unobserved phone sequence of speech based, at least in part, upon a variational learning technique;* ***wherein the model component is based, at least in part, upon a hidden dynamic model in the form of a segmental switching state space model, the segmental switching state space model comprises respective states having respective durations in time corresponding to soft***

boundaries of respective phones in the unobserved phone sequence. The subject amendments are supported by the specification. For example, the specification discloses that segmental constraints can be applied to a speech model in order to force states used by the model to be consistent in time with a phonetic transcript. (*See* p. 14, ll. 9-14). Further, the specification discloses that estimated soft phone assignments can be utilized by the model to facilitate recovery of a phone sequence. (*See* p. 7, ll. 26-29).

Hogden relates to a speech processing methodology called Maximum Likelihood Continuity Mapping (Malcom), which models acoustic speech data as a continuous pseudo-articular path. (*See, e.g.,* col. 5, ll. 10-13). Malcom determines a pseudo-articular path for a given set of acoustic speech data by finding the pseudo-articular path that would be most likely to produce the acoustic speech data. (*See, e.g.,* col. 8, ll. 31-37). However, as conceded by the Examiner on page 5 of the Office Action, Hogden does not disclose the use of a hidden dynamic model in the form of a segmental switching state space model. To overcome this deficiency of Hogden, the Examiner cites Ghahramani *et al.* Said reference relates to the creation and use of segmental switching state space models for applications in fields such as econometrics and signal processing. (*See, e.g.,* p. 1, para. 5). In addition, Ghahramani *et al.* describes two experiments performed using segmental switching state space models. The first of these experiments was performed on artificial test data generated by two state-space models. (*See* Section 5.1; p. 12, para. 6). The second of these experiments was performed on respiration force data obtained from a person with sleep apnea. (*See* Section 5.2; p. 13, para. 3). However, independent claim 1 recites that ***the model component is based, at least in part, upon a hidden dynamic model in the form of a segmental switching state space model, the segmental switching state space model comprises respective states having respective durations in time corresponding to soft boundaries of respective phones in the unobserved phone sequence***. The cited references do not disclose or suggest such features.

While Ghahramani et al. discloses employing a model comprising discrete states for signal processing, said reference is silent as to employing a model comprising discrete states having respective durations in time corresponding to soft phone boundaries, as recited by independent claim 1. In particular, Ghahramani *et al.* discloses two examples of segmental constraints that can be used to generate discrete states for a data model. In

the first example, a segmental switching state space model receives an input signal created from two state space models and divides the input signal into the segments produced by the first model and the segments produced by the second model. (*See* Section 5.1; p. 12, para. 6). In the second example, a segmental switching state space model divides an input signal corresponding to respiration force into segments corresponding to periods of rhythmic breathing and segments corresponding to periods of apnea. (*See* Section 5.2; p. 13, para. 3). However, neither of these examples is sufficient to suggest segmentation of model states based on phone boundaries.

In both of the examples disclosed in Ghahramani *et al.*, segmentation was based on input data with two well-defined states. On the other hand, a segmental switching state space model for speech data, such as the model recited by independent claim 1, requires segmentation based on phone boundaries. (*See* p. 7, ll. 26-27). The number of phones possible in human speech clearly far exceeds the two states on which the segmentation in the examples described in Ghahramani *et al.* was based. Further, segmentation based on phone boundaries must account for much more subtle differences in an input data stream than the differences between states presented by the well-defined states utilized in the examples given in Ghahramani *et al.* The subtle differences between states based on phones in a phone sequence, as recited by independent claim 1, demonstrate that applying a segmental switching state space model to a speech application would involve adaptation of a data model beyond the teachings and/or suggestions of Hogden and Ghahramani *et al.* Thus, the cited references, either alone or in combination, do not disclose or suggest all limitations of independent claim 1.

Independent claims 12 and 19-21 have been amended to recite similar features, namely *a model based, at least in part, upon a hidden dynamic model in the form of a segmental switching state space model, the segmental switching state space model comprises respective states having respective durations in time corresponding to soft boundaries of respective phones in the unobserved phone sequence.* Accordingly, the cited references, either alone or in combination, do not disclose or suggest all limitations of independent claims 12 and 19-21 for the reasons stated above regarding independent claim 1. In view of the foregoing, applicants' representative respectfully requests that this rejection be withdrawn.

III. Rejection of Claims 6 and 14-18 Under 35 U.S.C. §103(a)

Claims 6 and 14-18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hogden in view of Ghahramani *et al.* and further in view of McDonough (US 5,652,748). Withdrawal of this rejection is requested for at least the following reasons.

With regard to claim 6, Applicants' representative notes that independent claim 1, from which this claim depends, has been amended to recite features not disclosed or suggested by Hogden or Ghahramani *et al.* Further, McDonough does not cure the deficiencies of said references with regard to independent claim 1. Thus, the cited references, either alone or in combination, do not disclose or suggest all limitations of claim 6.

In addition, independent claims 14 and 17 (and their corresponding dependent claims) have been amended in a similar manner to independent claim 1 to include a segmental switching state space model comprising states having respective durations in time corresponding to soft boundaries of phones in a recovered phone sequence, which is not disclosed or suggested by Hogden or Ghahramani *et al.* Further, McDonough does not cure the deficiencies of said references with regard to independent claims 14 and 17. Accordingly, the cited references, either alone or in combination, do not teach or suggest all limitations of claims 14-18. In view of the foregoing, Applicants' representative respectfully requests that this rejection be withdrawn.

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063[MSFTP435US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,
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